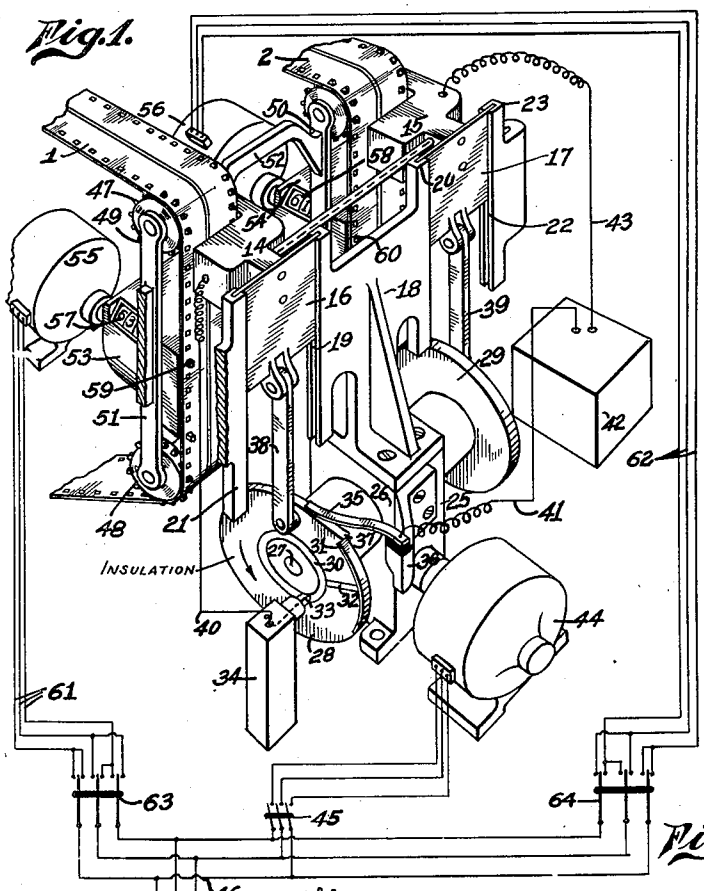
June 30, 1936. J. B. WALKER 2,045,624

METHOD AND MEANS OF RECORDING AND REPRODUCING SECRET MESSAGES

Original Filed May 16, 1932

Fig. 1.



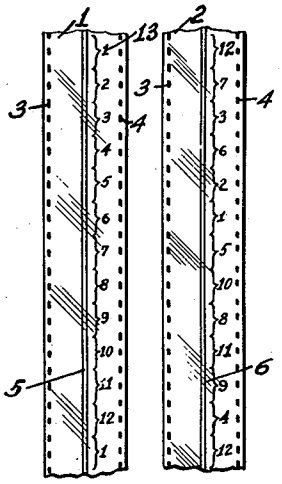


Fig. 3.

Fig. 4.

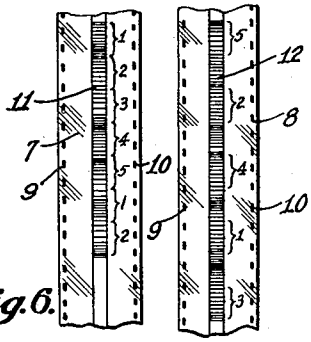


Fig. 6.

Fig. 7.

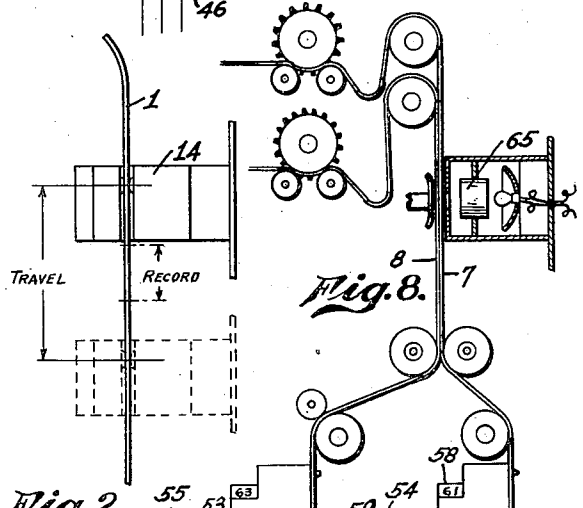


Fig. 2.

Fig. 8.

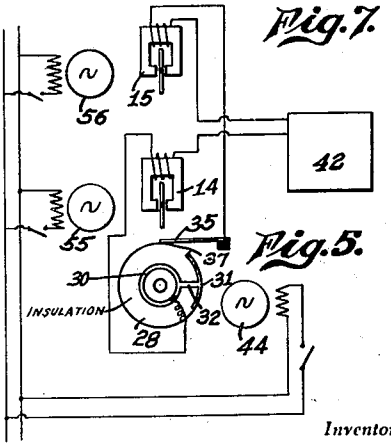


Fig. 5.

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2,045,624

METHOD AND MEANS OF RECORDING AND REPRODUCING SECRET MESSAGES

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Continuation of application Serial No. 611,449, May 16, 1932. This application December 26, 1933, Serial No. 704,040

14 Claims. (Cl. 179—1.5)

This invention relates to improvements in apparatus for a method of transmitting and transposing messages.

The invention is not to be confused with ordinary cryptograms, code words, or the like, nor is the method or means for carrying out the method of the speech "scrambler" type such as now generally employed for the transmission of voice by radio telephony.

This application is a continuation of application Ser. No. 611,449, filed May 16, 1932, and allowed April 13, 1933.

The invention has for an object the provision of a method and apparatus whereby the original record of the voice or any other sound having a definite meaning may be recorded in a chosen sequence. This sequence is again recorded but the continuity thereof is altered, changed, inverted, reversed, or transposed with respect to the first recording. The second record contains the secret message and to retranspose the same to produce the original record, the sequence of the transposition must be known. For instance, taking an ordinary film upon which recording of the voice is made by photographic means, a single word such as "can" may occupy, so far as sound is concerned, different portions of three feet of film. Included within said three feet might be many other words similarly transposed. However, the word itself, even if it could be found, might require running of the film forwardly or backwardly within say the three foot limit just mentioned. Considering the phonetics of a word such as "night", three vowels are used, to-wit: "na", "e" and "ta". Thus, in the transposed record of the original word, the "na" portion might be at the commencement, the "ta" might be midway between the three foot length, and the "e" sound at the end of the three foot length. It will thus be seen how difficult it would be for any one running the film containing the plurality of jumbled up sounds to re-transpose it unless the key to such transposition was known. If code words are likewise used, the detection of the message would be almost impossible. This, by way of summary, states the elementary basis of the invention.

The invention is particularly useful for diplomatic messages, as it may be readily transmitted over a wire or by radio, the received message being delivered to the proper recipient who, having a proper code or sequence, may decode the message. The invention is particularly adaptable for military and naval use, permits a message to be delivered to any active battle force, and to be readily transcribed. A different transposition key may be used for each day of the week and in this manner, only the one holding the key would know which key was to be used. Thus, the commencement of the message might have a secret signal which would indicate the proper key for transposing the message.

The World War demonstrated the fact that the average cryptograph or code message could be deciphered for the very reason that certain reoccurrences of letters will almost always occur in any given system. With the present system and means, there is no key to reoccurrences of any letter. Furthermore, it is possible to record many secret messages upon the same tape or photographic film, certain of which messages have no meaning whatever, and others of which, according to the code, would have a meaning. In this way, any one having unauthorized possession of the inverted or transposed message would be unable to determine the proper method or the proper sequence for transposition back into the original message.

The present invention has been thoroughly tested and a simple message submitted to leading experts to decipher. After considerable time, it was found that the experts were unable to decipher or decode the most simple arrangement or aggroupment in the transposed recording.

The following detailed description sets forth the invention and method in its most elementary form.

With the above set forth uses of the invention, the invention includes among its further objects a system and means for transmitting and transposing secret messages which is easily operable, maintains the message secret except to the one having the key to the transposition thereof, does not require the use of complicated apparatus, and is inexpensive in cost of manufacture and the materials to be used.

With the above and other objects in view, the invention consists in the novel and useful provision, formation, construction, association, as well as method of use of the invention, all as shown in certain embodiments in the accompanying drawing, described generally, and more particularly pointed out in the claims.

In the drawing:

Figure 1 is a fragmentary perspective view of certain apparatus, together with diagrammatic wiring, which may be utilized in practicing the invention.

Figure 2 is a side elevation illustrating certain of the apparatus and its travel relative to a tape having a recording thereon.

Figure 3 is a fragmentary front elevation of a tape having a recorded area thereon arranged in a certain sequence.

Figure 4 is a fragmentary portion of a tape having an altered recorded sequence from that of the recorded sequence of Figure 3.

Figure 5 is a wiring diagram of the apparatus shown in Figure 1.

Figure 6 is a fragmentary front elevation of a film having a recorded area thereon in a certain sequence.

Figure 7 is a fragmentary front elevation of a film in which the sequence or continuity of the recordation of Figure 6 has been altered, and,

Figure 8 is a diagrammatic side elevation, partly in section, of means for recording messages on photographic film.

Referring now with particularity to the drawing, I have shown in Figures 3 and 4 a pair of tapes 1 and 2 perforated as shown at 3 and 4 adjacent the marginal edges. Both tapes are adapted to have longitudinally secured thereto steel wires 5 and 6. This constitutes one type of member adapted to receive a recording. It is apparent that other types may be utilized, such as tape or a disc, both made of steel. In Figures 3 and 4, I have illustrated sections of celluloid film 7 and 8 provided with standard perforations adjacent marginal edges, as shown at 9 and 10 for both strips of film. In the present instance, both films carry longitudinal sound tracks 11 and 12. Figure 1 illustrates in perspective a simple form of apparatus for recording sound on steel tape or wire, and Figure 8 illustrates diagrammatically means for recording sound tracks.

Referring first to Figure 1, we assume that the tape 1 has been recorded in any ordinary manner, such as generally used for recording sound on metal. To do this, the well known system invented by Poulsen and termed the "telegraphone" may be utilized. This system is based upon the peculiar magnetic properties of hard steel which permit it to receive and retain magnetic impressions that are fixed in position. In what follows, it is assumed that a reader of this specification is familiar with the "telegraphone" and its operation, and if the reader is not, then he is respectfully referred to the Standard Handbook for Electrical Engineers, fourth edition, published by McGraw-Hill Book Company, page 781, et seq.

The tape 1 has a message recorded thereon. This message is in sequence as indicated by the sequential numerals shown thereon at 13. Thus, taking the message in the sequence shown by numbers 1 to 12 inclusive, the words might be "Company six will at eleven fifty advance toward hill thirty under barrage." The transposed message shown in Figure 4 would read "Barrage advance will fifty six company eleven thirty toward under hill at." However, it is evident that if this was all there was to the system, such a message could be readily deciphered. Therefore, taking the word "company", if the word "company" is spoken, it may occupy all that area included between 1 and 2 of Figure 3. However, when the word "company" is transposed, it will be divided into twelve sections and in, say, the order shown in Figure 4. It is evident that if the word "company" was transposed in accordance with the numerical arrangement shown in Figure 4, the sound emitted from a receiving apparatus would not approximate or even sound like the word "company", or, to go one step further, suppose the word "company" a word of three syllables, occupied the area marked 1, 2, and 3 of tape 1, it will be noticed that the word would be divided as follows: For tape 2, the "y" sound would be at 3, the "pan" at 2, and the "com" at 1, the sequence being in tape 2; 3, 2, 1 or backwards, and the word would sound as if it were written "y-pan-com". However, as the word "six", a one syllable word, has been interposed between the "y" and "pan" of "company", it is evident that the sound resulting would be "y", "six", "pan", "com". In actual use, a word or series of words would not occupy so small a space, and the word "company" might be interposed on three feet of tape and the code numerals be of a high order, say 1 to 100, or even 300. Furthermore, the spacing would not be uniform although a given area of movement for the tape would be uniform. This is best illustrated in Figures 3 and 4 which show a sound track and wherein it will be seen that actual voice has occurred in the area marked 1, no voice at 2 and 3, and another recording at 4 and 5. For the film shown at 8, only certain of the areas have recordings, to-wit, the areas marked. The sound track areas in between might contain other messages.

Referring to Figure 1, I have illustrated in perspective a simple form of apparatus operating upon the "telegraphone" principle. This apparatus includes a receiving electromagnet 14 and a transmitting electromagnet 15. These magnets are secured to slides 16 and 17, respectively, and the slides move within guideways forming a part of a supporting structure or framing and which framing includes a bracket 18 formed with edge grooves or guideways 19 and 20. Guideway members 21 and 22 are also provided, the guideway of the member 22 facing the guideway 20, and the guideway of the member 21 facing the guideway 19. The slides are adapted for movement in the said guideways. The bracket 18 is mounted upon a suitable block 25 forming a part of the framing. This block 25 is provided with a transverse bore through which is passed a tubular housing 26. A shaft 27 in turn is passed through said housing, and discs 28 and 29 are carried by ends of the shaft. The disc 28 constitutes a commutator, in that the surface is provided with a circular metal strip 30 while the periphery of the disc is provided with a segmental contact 31 with an electrical connection between said segment and the metal strip 30. A brush 33 carried by a suitable post 34 is adapted to bear against the metal strip 30. A contact arm or brush 35 is suitably insulated from and attached to a bracket 36 in such a manner that a portion of the arm or the brush at all times bears against the rim or periphery of the commutator disc. The periphery of the commutator disc has a variation in radius in the zone adjacent one end of the segment 31, as shown at 37, so that when the brush 35 leaves said portion 37, it makes snap contact with the segment.

Links 38 and 39 are interposed between the two discs 28 and 29 and the slides and in such a manner that the slides make one complete oscillation within their guideways for each revolution of the discs. There is an electrical connection 40 between the brush 33 and the receiving electromagnet 14, and an electrical connection 41 between the brush and arm 35 and a source of electrical supply including an amplifier 42, and a further connection 43 between said device 42 and the recording magnet 15. The return circuit is

through a ground which would include the framing. A motor 44 is adapted to turn the shaft 27 in the direction of the arrow on the disc 28. A switch 45 included in an electrical circuit 46 controls the supply of electricity to the said motor.

The electromagnets 14 and 15 are adapted to be in close proximity to the steel wire or tape adapted to be moved a definite distance in accordance with a predetermined standard. In the present instance, I utilize the small steel tapes 5 and 6 carried upon larger perforated tapes 1 and 2. It is also evident that the steel tape itself might be provided with marginal perforations.

I provide spaced pairs of upper and lower sprockets 47 and 28, one pair being shown at 49 and the other pair at 50, and the sprockets are suitably spaced apart by framing 51 and 52, which framing may be associated with the framing for the slides. Also, carried by the sprocket framing is tape movement mechanism 53 and 54. This mechanism includes motors 55 and 56, adapted to drive counters 57 and 58, and feed fingers 59 and 60. Electrical circuits 61 and 62 lead to the motors 55 and 56, respectively, through switches 63 and 64 included in the circuit 46. The switches 63 and 64 are of the pole changing type whereby the motor may be caused to reverse the direction of rotation as desired. The tape 1 is adapted to be passed over the upper and lower sprockets 47 and 48 of the one pair 49, and the tape 42 is passed over the other pair of sprockets 50. In each instance, the wire tape is in close proximity to the electromagnets 14 and 15.

Referring to Figure 8, I have illustrated a simple optical printing system for strip film. The original strip film 7 is passed through a printer 65 and rearwardly of said printer is a negative which, in this instance, would be the strip film 8. Both films are passed over suitable sprocket wheels the same as for the tapes 1 and 2 and moved through the medium of motors, the same as shown at 55 and 56, which motors drive counters and likewise feed fingers adapted to engage the perforations in the film and to move it in one of two directions. The same reference characters that applied to the tape movement mechanism will apply here.

The operation, uses and advantages of the invention just described are as follows:

Referring first to Figures 1 to 4, inclusive, the tape 1 has had a message impressed upon the steel wire or tape 5 thereof in a certain sequence, as indicated by the numerals. In other words, the message has been continuous and in order. It is now desired to transpose, invert, or re-arrange the said message on a second tape 2, in such a way that the sequence and continuity thereof is entirely changed from the original so as to make the message recorded on the second tape unintelligible. Assume that both tapes are in the position shown in Figure 1. Referring to the counter 57, the number 63 is viewed. This means that at point 63 on the tape, there is a word or a fraction of a word or some sound which is to be recorded on tape 2. The code sequence for the tape 2 is number 61. The motor 44 is then energized by throwing the switch 45 in line with the source of current supply and this motor will rotate both discs 28 and 29. There is an electrical circuit between the electromagnets 14 and 15, the amplifier and battery 42 and the commutator which forms a part of the disc 28. As the commutator and the disc 29 rotate, the slides are reciprocated once for each complete revolution of the said discs. However, at one point in movement of the slide, electricity is passed through the electromagnets. This position is predetermined so that at the time electromagnets are energized, the moment of inertia of the slide due to commencing its movement has been overcome (see Figure 2) wherein it will be seen that the travel of the electromagnets is comparatively long relative to the zone marked "record" which would be the position when the electromagnets were energized. If we now assume that the next number of the code for tape 1 is 64, the switch 63 would be moved to the right or left, depending on the direction of rotation of the motor, so that the motor would turn the counter mechanism to 64 and at the same time the feed fingers would advance the tape a proper distance. This distance might be directly next to the recorded area already on the tape 1 or it might be a greater distance with an uneven gap between the former recorded area and the next recorded area. The moment 64 appeared in the counter, the switch would be moved to break the current supply to the motor. If the sequence for tape 2 should now read 5, the switch 64 would be thrown so as to reverse the motor 56 until the counter registered 5 which would, of course, move the tape 2 backwardly, and when 5 appeared, the switch would be moved to break the current through the motor. The next step would consist in closing the switch 45 to again reciprocate the electromagnets and the receiving magnet 12 would transmit an electrical current to the transmitting electromagnet 15, which would make a record on the tape 2, by transforming the magnetic variations on the tape 1 into electrical variations by electromagnetic induction, and again transmitting the electrical variations into electromagnets to record said magnetic fluctuations onto tape 2.

The film would operate on substantially the same principle as for the tapes 1 and 2. The film 8 would correspond to the tape 2 and the film 7 to the tape 1. The construction is such that both films may be moved forwardly or backwardly, depending upon the sequence desired, to the end that the recorded areas on the film 8 might be changed, inverted, altered, reversed or transposed with respect to the original recording or its fractional components.

Obviously, to restore the message to the original form, the film 8 or the tape 2 would be run through a machine of some type, such as depicted in Figures 1 or 8 until the numbers appeared therein, the code being known, whereupon the film or tape to receive the record would be moved in accordance with the code. For instance, using the tape, if the tape 2 were to have the electromagnet 14 passed thereover, it would be run forwardly or backwardly until the number 1 appeared in the counter 57, whereupon motor 44 would be energized and a recording made on the opposite tape, and the same sequence would be followed. Therefore, it becomes necessary to determine the proper point of starting the tape and this may be done by pre-arranging a certain recorded signal which would indicate the starting point from which the code numbers, letters, or other insignia, representing a sequence is to be followed for decoding purposes, for instance, a whistling sound, or some mark on the tape might indicate the starting position and this position might be given a number. The same sequence would be followed for the film. The tape or film may have recorded thereon many messages and while voice recordings may be employed, it is apparent that other types of records might be used, for instance,

music, wherein different notes of the violin would indicate certain words. As an example, the notes of the scale run from "A" to "G". Therefore, fundamental tones could be played on these notes and a trained listener would know which notes representative of letters, were being played. These letters, according to the code, would have a certain significance if played in a certain sequence. Therefore, while the original recording might not have an agreeable sound to the ear, nevertheless the inverted, altered or changed recording would not be any the less musical. It would be practically impossible, upon hearing the transposed or inverted sound, to tell the character of the original message unless the code or sequence is known to the listener. It is also possible to make many inversions; for instance, the record on the tape 2 or film 7 might be inverted to the *n*th degree. For instance, the commander of one battleship would receive the inverted message which has been inverted, say, once. The commander of a second battleship having an entirely different code would receive message number 2 which has been inverted twice, and so on. In this way, the commander of each battleship would have a different method of translating the message, although given the code, only one running of the inverted message would be necessary although separate inverted messages were made originally. Messages of this character could be mailed during peace times, complete diplomatic messages and instructions given ambassadors without fear of detection of the contents, and various and sundry other uses that will readily suggest themselves to any one interested in the art of secret messages.

I have shown two adaptations of the invention which, as previously stated in the objects of the invention, are merely illustrative of a simple embodiment of the invention. Obviously, the apparatus to be used would be considerably refined in accordance with the particular use and place of use of said apparatus. It is possible to use a single steel wire fastened between two spools both provided with continuous spiral grooves, one end of said wire being attached to one spool and as the one spool is rotated, it tends to unwind the wire from the opposite spool. If the wire is kept substantially taut, the message may be readily inverted into the original message. This system would readily suggest itself to any one skilled in the telegraphone art and in fact such a telegraphone has already been on the market. The inventor does not claim any particular type of telegraphone or, for that matter, any type of sound recording device, as different types may be employed. It may be difficult, however, on the actual battlefield to utilize the photographic sound recording system, and in this case, the telegraphone method readily suggests itself. However, it is possible to use perforated tape similar to the ordinary type of telegraphic tape. This tape could be readily run through a machine and, knowing the code, a second tape would receive an inverted or transposed message. The recipient of the inverted or transposed message who understands the code, could again reinvert the message into the proper sequence on a tape which, when run through proper telegraphic apparatus, would give the original message.

It is also possible to provide apparatus which s automatic in its functioning, to-wit, a code strip could be made which when attached to the machine, would automatically operate the motors forwardly or backwardly during the making of a record. In this connection, the original voice arrangement could be directly impressed upon a film or wire, or other recording medium, wherein the automatic means would move the film or wire, the person speaking talking at a determined rate and in sequence, so that the dictation would be directly produced but inverted or arbitrarily arranged when recorded. This would do away with the first tape or film. Another system would be to have the message in its proper sequence, apply the code thereto, and then talk off the message in accordance with the code and with a direct recording thereof, the inverted message being so arranged that portions of the words would be recorded at different zones of the film, wire or other device. It is also possible, within the purview of the invention, to use a tone modulator so that if spoken voice is used the character of the voice could be modulated, with the result that a very confusing sound would be obtained in the inverted record and one that would be hard to decipher.

I wish to emphasize the fact that my present invention has important advantages over certain methods heretofore proposed for the sending of secret communications one of which is that the synchronization between the apparatus of the sending and receiving stations, so important in previously used systems is not at all necessary under my method. This not only avoids the possibility of the purposes of my invention being defeated by the sending and receiving apparatus getting out of step, but it also makes possible the transmission of the message from the sending to the receiving station at such time as may be most convenient or practicable.

Whatever synchronization takes place under my method and in my apparatus, takes place within the machine and within either the sending or receiving station and is carried inherent in the message. That is to say, there could be an interval of hours or even days between the time of producing the message of transposed sequence and the time of sending such transposed message at the receiving station. In like manner, it is a matter of great convenience that at the receiving station the re-recording and re-transposition of the sent message may be carried out at any convenient time and not necessarily at the moment of sending the message to the receiving station. This constitutes a matter of great importance in military operations where messages may be received under conditions of great stress, as for example, under heavy bombardment or at the beginning of a retreat or otherwise.

A further important advantage of the method herein shown and described is that absolute secrecy may be maintained, not only with respect to outsiders, but even with respect to minor assistants employed in connection with the operation of the apparatus. For example, the individual who conducted the re-transposition of the message at the receiving station would, at the conclusion of the operation, be in possession of a record containing the message in intelligible form, but if he had no reproducing instrument upon which to place said record so that he could listen to the same, he would be no more informed as to the context of said message than anyone else, and thus, if such message were delivered to a superior provided with such a machine, the latter would be the only one who would be informed as to the context of the message, despite the fact that such message had passed through one or more hands.

The foregoing is true with respect to the individual at the sending station who makes the first record of irregular sequence.

A further advantage of the method described is that it lends itself to the transmission between stations through various media with perfect safety. That is to say, having produced the record of irregular sequence and one which is unintelligible until re-transposed, such record may be sent between distant stations either by telephone, telegraph, radio, or by manual delivery.

In systems where synchronization between stations is of the essence of the process, sending between stations is limited to the particular apparatus that has been designated for that purpose, while in my case, the transmission may be made by many forms of commercial apparatus and consequently I am able to reach all parts of the world with facility and economy, and, as above stated, independently of the time element so essential in synchronization. This means that messages under my system may, if transmitted by commercial apparatus, be transmitted during those hours at which the cost is the least.

Having described my invention, what I claim is:

1. The herein described method of transmitting secret messages from a sending to a receiving station which consists of recording an intelligible message in regular order upon a message carrier record, recording said message from said record in irregular order but in a predetermined sequence upon a second message carrier record at the sending station, transmitting said irregular message by any suitable means to a message carrier recorder at a receiving station and there re-recording the same from said last named message carrier recorder into its original regular and intelligible form upon another carrier record, and in an operation separate from the transmission of the message from the sending to the receiving station.

2. The herein described method of transmitting secret communications which consists of producing at a sending station an intelligible message in regular order in the form of a sound produced record, re-recording from said record and in irregular sequence upon a message carrier transmitting said latter message from said message carrier upon another message carrier at a distant receiving station and there re-recording the message from the last named carrier to an additional carrier while restoring it to its original regular order and in an operation independent of the operation of transmitting the message from the sending to the receiving stations, whereby the necessity of synchronization between said stations is eliminated.

3. The herein described method of transmitting secret messages from a sending to a receiving station which consists in recording an intelligible message in regular order upon a message carrier record, re-recording said message from said record in irregular order, in predetermined sequence and in fixed form upon a second message carrier record at the sending station, transmitting said irregular message by any suitable means to a message carrier recorder at a receiving station and there re-recording the same from said last named message carrier record by a reversal of the process into its original regular and intelligible form upon a fixed sound record and in an operation separate from the transmission of the message from the sending to the receiving station.

4. Apparatus of the character described comprising a pair of travelling message carriers, a pair of magnets movable in juxtaposition thereto for transferring a message from one of said magnets with respect to said carriers, means for setting up current flow through said magnets through a limited and intermediate portion only of their travel, and means for permitting the shifting of the position of one of said carriers with respect to the other in an irregular sequence to thereby dispose the transferred message in an irregular order upon the carrier to which the message is transferred.

5. Apparatus of the character described comprising a first message carrier record, a second message carrier record, both located at a common station, means for permitting one of said carrier records to be moved in irregular sequence with respect to the other, and means for transferring a message from the first named carrier record to the second named carrier record in the irregular sequence caused by the difference in movement of the carriers, the last named record constituting a fixed record of the message transferred.

6. A structure of the character described comprising a pair of travelling webs each adapted to receive signal impressions, means whereby one of said webs may be caused to travel at an irregular sequence with respect to the other, and means for transferring signal impressions imposed upon one of said webs in regular order to the other of said webs in an irregular sequence determined by the relative difference in travel between the said two webs.

7. Apparatus for use in the sending of secret signals comprising a pair of machines adapted to be located at sending and receiving stations, respectively, each of said machines comprising a first travelling message receiving record and a second travelling message receiving record, the first travelling message receiving record of the machine of the sending station being adapted to have a message imposed thereon in regular order and under the action of sound waves, means permitting transfer of the message from the first named carrier of the machine of the sending station to the second carrier in irregular sequence, the second carrier of the machine of the receiving station being adapted to receive from the first named carrier of the machine of the receiving station a permanent record of the message adapted when utilized in a sound reproducing machine to deliver said message in the form of sound waves.

8. The herein described method of transmitting secret messages which consists of recording a message in regular order upon a message carrier record at a sending station and transferring said message to a second message carrier record at the same station in irregular order and in subdivisions of said message of such length that the individual components of said message occupy more than one of said subdivisions.

9. The herein described method of transmitting secret messages which consists in recording a message in regular order upon a message carrier record at a sending station and transferring said message to a second message carrier record at the same station in irregular order and in subdivisions of said message of such length with respect to the length of the component elements of the message that the said elements are not of uniform length with respect to said subdivisions.

10. Apparatus for the transmission of secret messages comprising a first tape, means for im-

posing the elements of a message upon said tape, a second tape, means permitting shifting of the tapes with respect to each other, and means for imposing upon the second tape the said elements of the message in an irregular sequence determined by the relative positions of said tapes.

11. The herein described method of transmitting secret messages which consists of recording a message comprising a plurality of units upon a message carrier record at a sending station and transferring the units of said message to a second message carrier record under the control of the first named message carrier record, in irregular order and in fractional parts of said units and also at the same station.

12. The herein described method of transmitting secret messages which consists of recording a message comprising a plurality of units upon a message carrier record at a sending station and transferring the units of said message to a second message carrier record under the control of the first named message carrier record, in irregular order and in fractional parts of said units, transferring the irregular message under the influence of the second message carrier record to a distant station and there restoring the message to its original form in an operation separate from the operation of sending the message between the said stations.

13. The herein described method of transmitting secret messages composed of a plurality of units which consists of recording said message upon a record carrier in irregular order and in fractional parts of said units at one station transferring the irregular message under the influence of said record to a distant station and there restoring the message to its original form in an operation separate from the operation of sending the message between the said stations.

14. The herein described method of transmitting secret messages composed of a plurality of units which consists of recording said message upon a record carrier in irregular order and in fractional parts of said units at one station, transferring said irregular message as imposed upon said carrier to a distant station and there restoring the message to its original form in an operation separate from the operation of transferring the message between said stations whereby synchronization between said stations is rendered unnecessary.

JOSEPH B. WALKER.